

Integrated Engineering Capability (IEC) Overview

July 12, 2006

The Integrated Engineering Capability mission is to improve the accuracy, availability, and control of engineering data through establishment of data automation and integration capabilities based on MSFC policies and processes.



INTEGRATED ENGINEERING CAPABILITY

Project Responsibilities

Leading Development and Implementation of the MSFC Design and Data Management System (DDMS) - A web-enabled Product Lifecycle Management (PLM) tool that provides an infrastructure for managing engineering and project data, including documents, change requests, CAD, parts, procedures, and quality records.

Managing Legacy Configuration Management and Collaboration Tools - Virtual Research Center (VRC), Integrated Configuration Management System (ICMS), Change Processing, Tracking, and Accounting System (CPTAS), Engineering Order (EO) Number Request and Trending System, MSFC Review Item Discrepancy System (RIDS).

Managing CAD Licensing and Leading MSFC CAD Transition to Pro/Engineer (Pro/E)

- Licenses
- Training
- Design Standards
- Adoption
- CAD Management and Inter-Center Collaboration
- Migration/Translation
- Analytical Tools



Alignment to Agency Strategy

The IEC Project aligns directly with the 2003 NASA Strategic Plan¹, OneNASA², CAIB³, The Vision for Space Exploration⁴, and NASA's Direction for 2005 and Beyond⁵ by:

- establishing collaborative engineering capabilities
- improving data management and control
- providing CAD design, translation, and integration capabilities
- providing as-designed vs as-built product management
- reducing life-cycle costs
- providing project metrics and management decision tools

¹ 2003 NASA Strategic Plan implementing strategy, IS-3 - *“implement collaborative engineering capabilities and integrated design solutions to reduce the life-cycle cost and technical, cost, and schedule risk of major programs”*.

² OneNASA recommendation 6 - *“enhance cross-Agency collaboration by putting in place common engineering and collaborative tools and databases, processes, and knowledge-sharing structures”*.

³ CAIB finding F7.4-11 - *“the Space Shuttle Program has a wealth of data tucked away in multiple databases without a convenient way to integrate and use the data for management, engineering, or safety decisions”* and finding F10.3-1 - *“the engineering drawing system contains outdated information and is paper-based rather than computer-aided”*.

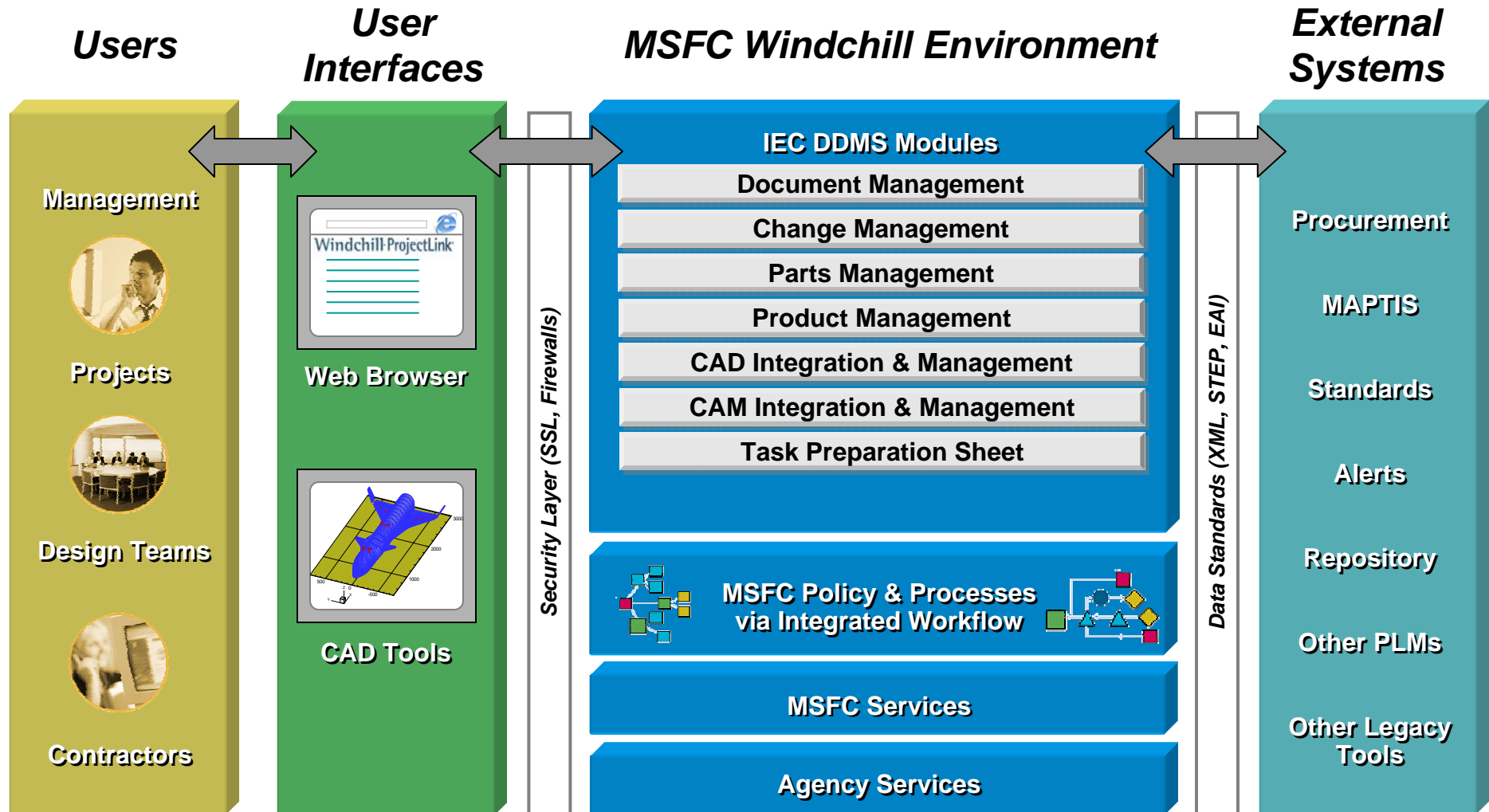
⁴ The Vision for Space Exploration - *“develop the innovative technologies, knowledge, and infrastructures both to explore and to support decisions about the destinations for human exploration”*.

⁵ NASA's Direction for 2005 and Beyond, NASA's Guiding National Objective #3 - *“Develop innovative technologies, knowledge, and infrastructure both to explore and to support decisions about the destinations for human exploration.”*



INTEGRATED ENGINEERING CAPABILITY

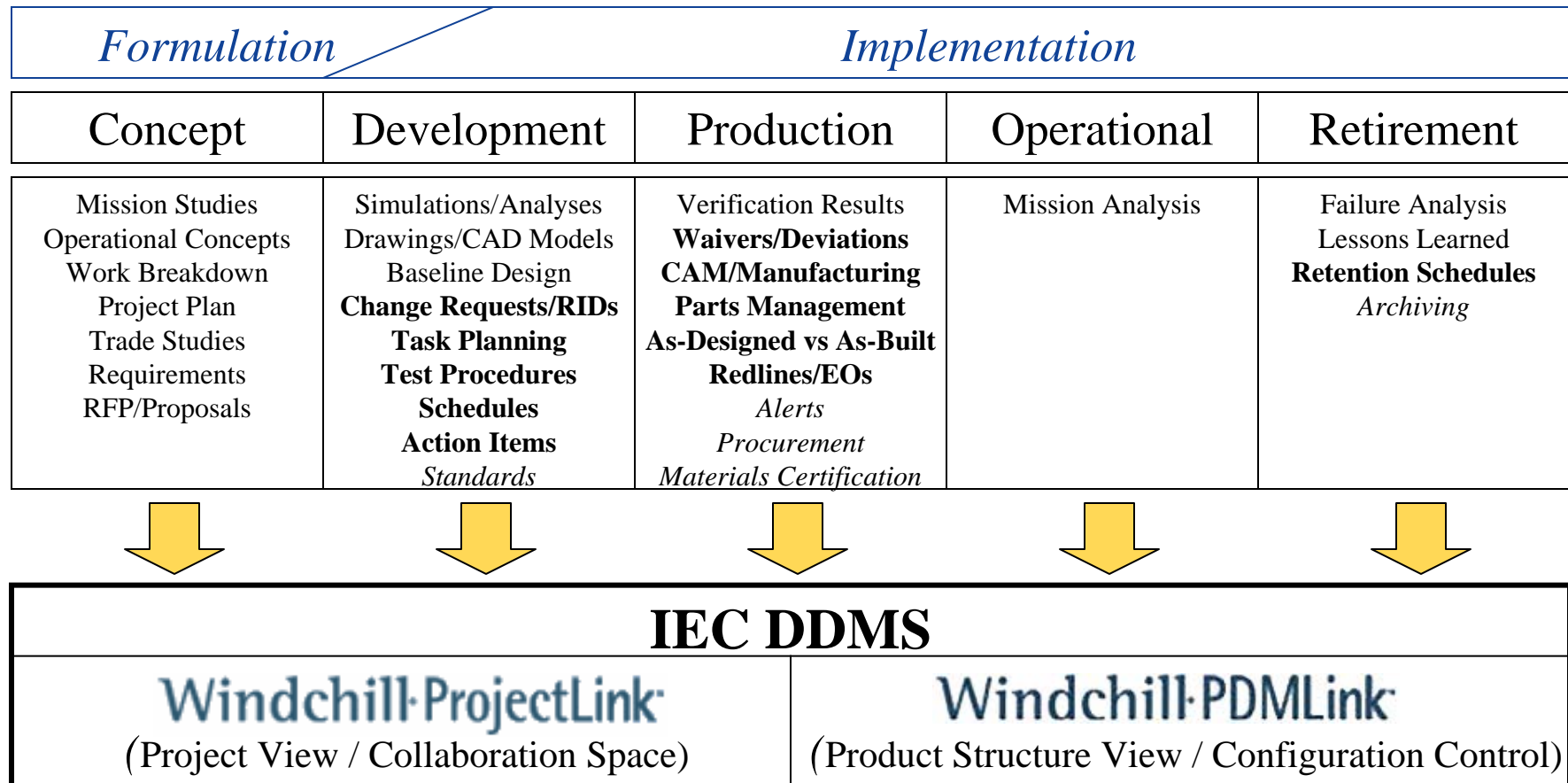
DDMS Framework





INTEGRATED ENGINEERING CAPABILITY

DDMS Support for Project Lifecycle



Managed Data Object (Developed Externally, Controlled in Windchill)

Managed Data Content (Content Input Directly into Windchill, Controlled in Windchill)

Integrated Data Content (Developed and Controlled in External System, Linked to Windchill)



INTEGRATED ENGINEERING CAPABILITY

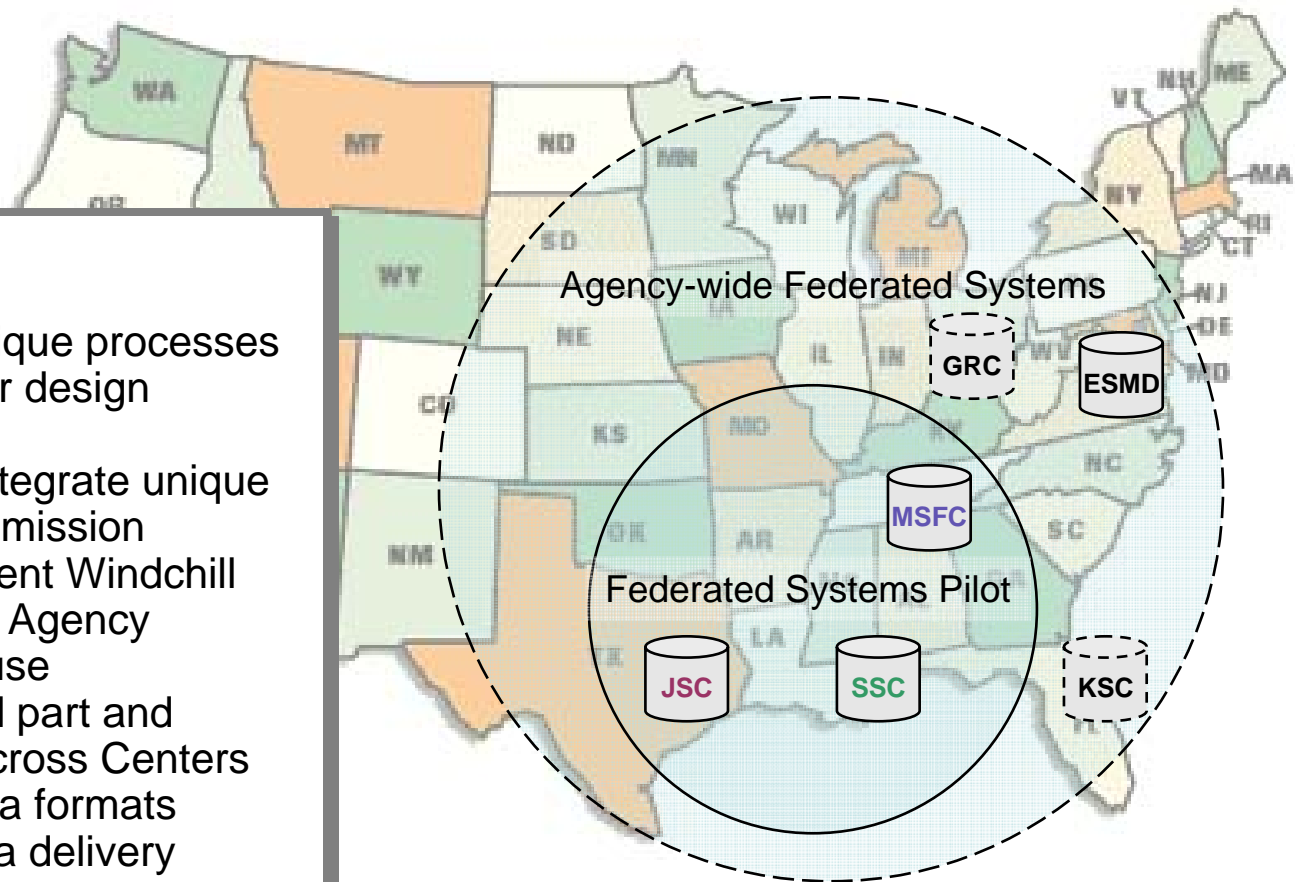
Federation Concept

Develop and implement pilot to federate JSC and MSFC Windchill environments

Expand federation framework across Agency to tightly integrate engineering systems

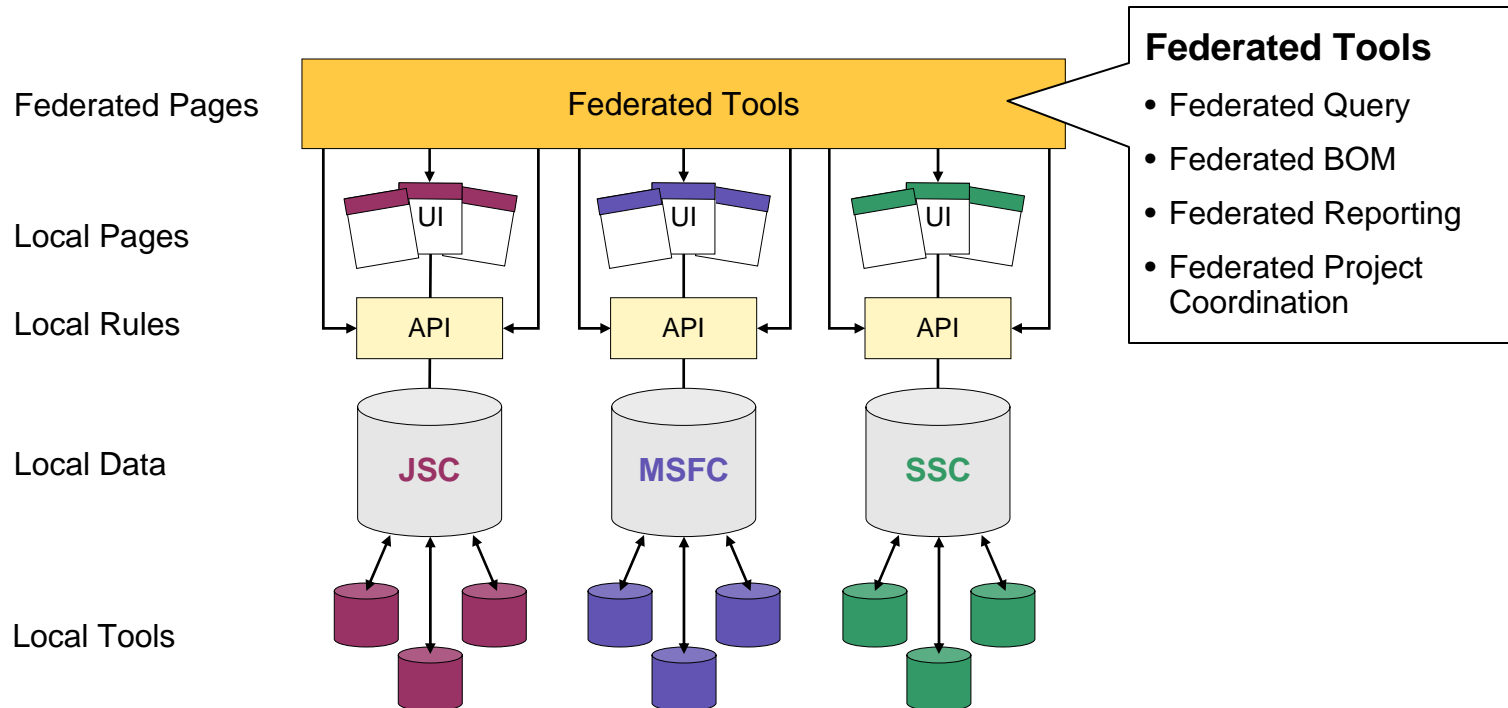
Federation Drivers

- ✓ Allow for Center unique processes
- ✓ Improve inter-center design collaboration
- ✓ Allow flexibility to integrate unique tools tied to Center mission
- ✓ Leverage independent Windchill investments across Agency
- ✓ Increase design reuse
- ✓ Establish integrated part and product structure across Centers
- ✓ Foster common data formats
- ✓ Simplify vendor data delivery



Federation Model

Center Integration through Federated Tools will provide broader visibility across the Agency, but defer most of the management responsibility to local systems.








INTEGRATED ENGINEERING CAPABILITY

DDMS Focus Areas

DDMS Core Capability

	Consolidating Tools & Migrating Data	Automating Manual Processes	Integrating with External Systems	Embedding MSFC Policies
Document Management 	MPDMS VRC	Sensitive Data Control (ITAR/EAR, SBU) DRDs, Deliverables Master Lists	NISE Agency Standards	MPR 1600.1 MPD 2190.1 MPR 7120.3, MWI 7120.2 MSFC-STD-555
Change Management 	FM Rids RIDS	ECRs, Directives Boards Records Management CM Reports/Metrics	Repository (Documentum)	MPD 2210.1 MPR 1440.2 MPR 8040.1 MSFC-STD-3394
CAD Management 	VIPA TeamCenter CAD Libraries Legacy CAD Data	Design Standards	CAD Translation	MSFC-STD-2806
Part Management	Electrical Parts DB Design Packaging DB EEE Parts DB Flight H/W Parts DB	Parts Lists (EPL)	JSC DDMS Federation Procurement	MPD 2800.1 MSFC-STD-555 MSFC-STD-3012
Product Management	ICMS/CPTAS ABCSS EO # Request System	Drawing Release Green Sheets	MAPTIS Alerts	MPR 8040.1 MPR 8040.2 MSFC-STD-555
Procedure Management	WATS/eTPS		SSC DDMS Federation	
Manufacturing Support	Visual (Quality)	Redrawing CAD Tool Path Generation Drawing Redlines, EO's MRB	Delmia	MSFC-STD-555



INTEGRATED ENGINEERING CAPABILITY

DDMS Benefits

*Improved **accuracy** of engineering data*

- Increased efficiency and accuracy in reporting on as-built vs as-designed product structure.
- Improved ability to translate and integrate CAD models from contractors or other Centers.
- Reduced data re-entry and errors due to non-integrated and incompatible design systems.

*Improved **availability** of engineering data*

- Improved design collaboration within MSFC and externally to other Centers and contractors.
- Improved collaboration and re-use of part/CAD libraries internal and external to MSFC.

*Improved **control** of engineering data*

- Improved data configuration control and accuracy over paper-based processes.
- Simplified approval routing resulting from automated processes/workflow.
- Streamlined Records management and archival control through integration with repository.
- Improved handling of sensitive data (e.g., ACI, ITAR) through system enforced rules.

*Resulting in **reduced costs** for administration, maintenance, and operations with **improved efficiencies** through consolidation of redundant engineering data management systems and automation of manual process.*

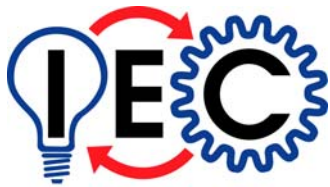
Back-up



INTEGRATED ENGINEERING CAPABILITY

Federation Accomplishments

- Investigated and identified key collaboration areas based on Centers' core functions and missions.
- Developed and validated a federated technology framework for sharing data safely and reliably across Center boundaries.
 - Established ability to query across multiple Center part and product structures that can be extended to all other Windchill areas.
 - Created ability to link data structures across Center boundaries and across projects (e.g., CEV to CLV).
 - Developed capability to launch and synchronize processes between multiple Center Windchill environments.
- Defined initial minimum set of common part attributes.
- Implemented a core prototype capability for sharing data across Center boundaries that is robust and conceptually easy for end-users to understand.
- Procured CAD translation tools to improve Centers' capabilities to standardize design tools and advance designs between Centers.



Federated Search and Assignments

INTEGRATED ENGINEERING CAPABILITY

Windchill PDMLink - Microsoft Internet Explorer provided by PTC

File Edit View Favorites Tools Help

Address: http://dfowler03l.ptcnet.ptc.com/Windchill70/wtcore/jsp/com/ptc/windchill/search/ExecuteSearch.jsp?history=48&keyword=%26keyword%3D

Learn | Help | Publications | E-mail Page | Hot Links

Home Product Change Library Organization Site

Overview Assignments Updates Checked-Out Work Meetings Notebook Subscriptions Reports Utilities

Advanced Search - Federated Search - Go Select Federated Servers (Current Setting: MSFC-DEV,DLF) Preferences

Name ES*
revision
Vault State -- No Selection --
Created MM/DD/YYYY
Modified MM/DD/YYYY

Search Clear

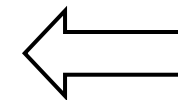
Refine Search

Parts (10 items)

All	Name	Number	Actions	Data Source	State	Version	Iteration
<input type="checkbox"/>	ES Tank Assembly	0000000061	ⓘ	MSFC-DEV	In Work	A	1
<input type="checkbox"/>	ES Tank Shell	0000000062	ⓘ	MSFC-DEV	In Work	A	1
<input type="checkbox"/>	ES Tank Cap	0000000063	ⓘ	MSFC-DEV	In Work	A	1
<input type="checkbox"/>	ES External Tank	0000000064	ⓘ	MSFC-DEV	In Work	A	1
<input type="checkbox"/>	ES Tank Foam	0000000066	ⓘ	MSFC-DEV	In Work	A	1
<input type="checkbox"/>	ES Tank Thermal System	0000000081	ⓘ	DLF	In Work	A	1
<input type="checkbox"/>	ES Thermal Coupler	0000000082	ⓘ	DLF	In Work	A	1
<input type="checkbox"/>	ES Tank Mounting Bracket	0000000083	ⓘ	DLF	In Work	A	1
<input type="checkbox"/>	ES Tank	1230000045	ⓘ	DLF	In Work	A	1
<input type="checkbox"/>	ES Tank Assembly (Proxy to MSFC-DEV)	0000000061	ⓘ	DLF	In Work	A	1

Page 1 of 1 First 1 Last

Refine Search



Search for Parts and Documents Across Centers

Internet Explorer provided by PTC

Help

Search Favorites Media

Address: http://dfowler03l.ptcnet.ptc.com/Windchill70/netmarkets/jsp/work/list.jsp

Learn | Help | Publications | E-mail Page | Hot Links

Library Organization Site

Overview Assignments Updates Checked-Out Work Meetings Notebook Subscriptions Reports Utilities

Recently Accessed: Last Login: Jan 10, 2006, 11:48 AM EST

Search within my work:

Current View: Open

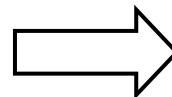
Subject	State	Deadline	Done	Assigned	Context
ECR 00061 - Coupler Redux	Open			Jan 10, 2006	FED-Test1
ECR 00041 - test100	Open			Dec 14, 2005	FED-Test1
ECR 00022 - Big 2	Open			Dec 7, 2005	FED-Test1
ECR 00021 - Big Problem 5	Open			Dec 7, 2005	FED-Test1
ECR 00002 - Dual Com System	Open			Dec 6, 2005	FED-Test1
ECR 00001 - Bracket Change	Open			Dec 6, 2005	FED-Test1

Federated Assignments

Description	Actions	Data Source	Owner
Submit the Enterprise Change Request (ECR) for review by the Change Administrator I.	ⓘ	DLF	feduser
Submit the Enterprise Change Request (ECR) for review by the Change Administrator I.	ⓘ	DLF	feduser
Submit the Enterprise Change Request (ECR) for review by the Change Administrator I.	ⓘ	DLF	feduser
Submit the Enterprise Change Request (ECR) for review by the Change Administrator I.	ⓘ	DLF	feduser
Submit the Enterprise Change Request (ECR) for review by the Change Administrator I.	ⓘ	DLF	feduser
Submit the Enterprise Change Request (ECR) for review by the Change Administrator I.	ⓘ	DLF	feduser
Analyze the Enterprise Change Request (ECR) to determine if it should be fast track, full track or rejected.	ⓘ	MSFC-DEV	feduser
Review Enterprise Change Request (ECR) and create Enterprise Change Notice (ECN).	ⓘ	MSFC-DEV	feduser

Overview | Assignments | Updates | Checked-Out Work | Meetings | Notebook | Subscriptions | Reports | Utilities

Consolidate actions and work assignments across multiple Center systems in one location





Federated Reporting Framework

INTEGRATED ENGINEERING CAPABILITY

Product Structure —
Related Documents

Federated Product Structure

- Federated Usage Report
- Federated Status Report

Federated Usage Report - Microsoft Internet Explorer provided by PTC

Federated Usage Report

Level	Part	Data Source	Quantity	Units
0	... 12300000451230000045 - ES Tank .A	DLF		
1	..... 00000000810000000081 - ES Tank Thermal System .A	DLF	1	each
2	..... 00000000830000000083 - ES Tank Mounting Bracket .A	DLF	12	each
2	..... 00000000820000000082 - ES Thermal Coupler .A	DLF	4	each
		MSFC-DEV	1	each
		MSFC-DEV	2	each
		MSFC-DEV	2	each
		MSFC-DEV	1	each
		MSFC-DEV	35	liters
		MSFC-DEV	25	liters
		MSFC-DEV	250	liters

OK

Federated Status Report - Microsoft Internet Explorer provided by PTC

Federated Status Report

Level	Part	Data Source	ECR	State
0	... 12300000451230000045 - ES Tank .A	DLF		
1	..... 00000000810000000081 - ES Tank Thermal System .A	DLF		
2	..... 00000000830000000083 - ES Tank Mounting Bracket .A	DLF		
2	..... 00000000820000000082 - ES Thermal Coupler .A	DLF	Coupler Redux	Open
1	..... 00000000610000000061 - ES Tank Assembly .A	MSFC-DEV		
2	..... 00000000640000000064 - ES External Tank .A	MSFC-DEV		
2	..... 00000000630000000063 - ES Tank Cap .A	MSFC-DEV	Thread Size Change	Under Review
2	..... 00000000620000000062 - ES Tank Shell .A	MSFC-DEV		
3	..... 00000000680000000068 - ES Adhesive Primer .A	MSFC-DEV		
3	..... 00000000670000000067 - ES Epoxy Resin .A	MSFC-DEV		
3	..... 00000000660000000066 - ES Tank Foam .A	MSFC-DEV		

OK

**Clickable hyperlink to
Center system location
where part is managed**

**View release status and
pending changes across
system boundaries**

**View parts tree/BOM
for Projects that span
multiple Centers**

For additional IEC information contact:

ED03/Patrick McDuffee 544-9163